TANTA UNIVERSITY

Electrical Power and Machines Engineering Department

Faculty Of Engineering

FINAL EXAM 2013/2014 – First Term

Course	Energy conversion (EPM2143)	Time	3 hours
Students	2nd Year (Computer and Control Engineering)	Mark	70
Date	4 / 1 / 2014	Number of pages	2

Answer ALL the following questions:

The first question (14 marks)

A. Draw and explain load characteristics of d.c. compound generator.

B. A 50 kW, 250 V series generator has an armature resistance of 0.02Ω and series field resistance of 0.045Ω The mechanical losses are 2.5 kW. At rated load Calculate:

a) Armature current.
b) Generated voltage.
c) Armature copper losses.
d) Field copper losses.
e) The generator efficiency.

The second question (14 marks)

A. Explain the various methods of speed control of d.c shunt motor.

B. A 200 V d.c shunt motor has an armature winding resistance of 0.1 Ω and the shunt field resistance is 400 Ω. When the motor draws a supply current of 10A, the rotational loss is 100W and the speed is 400rpm. Find.

a- The developed power.
b- The net output power.
c- The motor efficiency.
d- The net output torque.
f- If the flux is halved while the armature current is maintained constant Find the new speed for the same supply voltage
g- If the torque is doubled, find the new speed for the same supply voltage.

The third question (14 marks)

A. Explain the short circuit test and open circuit test on transformer. Why these tests are to be performed?

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B	A 2500/250 V, 50 Hz, 50 kVA, single-phase transformer has a resistance of 0.8 ohm and 0.012 and a reactance of 4 ohm and 0.04 ohm for high and low voltage windings respectively. Transformer gives 0.96 maximum efficiency at 0.75 full-load at unity power factor. The magnetization component of no-load current (I_m) is 1.2 A on 2500 V side. Find out ammeter, voltmeter and wattmeter readings on open circuit and short circuit test, if supply is given to high voltage side in both cases.

The fourth question (14 marks)

A	Discuss briefly the starting methods of a three-phase induction motor.
B	A 480 V, 60 Hz, 50-hp, three-phase induction motor is drawing 60 A at 0.85 power factor lagging. The stator copper losses are 2000 W, and the rotor copper losses are 700 W. the friction and windage losses are 600 W, the core losses are 1800 W. find the following quantities: a- The air gap power b- The power converted P_m c- The output power P_{out} d- The efficiency of the motor

The fifth question (14 marks)

A	What conditions are necessary for paralleling two synchronous generators?
B	A 200 V, three-phase star-connected round rotor synchronous generator gives on open circuit, e.m.f of 200 V, for afield current of 0.35 A. the same field current on short circuit causes an armature current of 12 A. the armature resistance measured between two lines is 1.8 ohm. Find the regulation for the current of 10 A at 0.9 lagging and 0.7 leading power factors.

Good Luck and best wishes
Dr. Abd El-Wahab Hassan